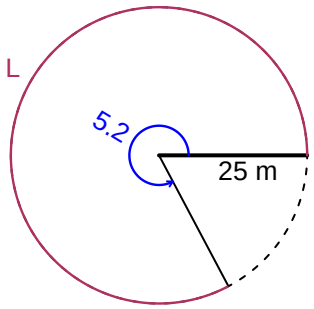
Name: Date:

Trig Final (SLTN v695)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 5.2 radians. The radius is 25 meters. How long is the arc in meters?

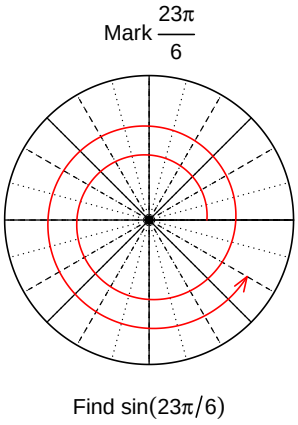


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

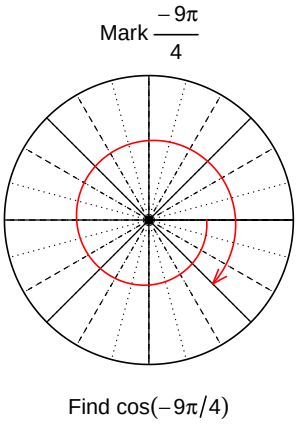
$L = 130$ meters.

Question 2

Consider angles $\frac{23\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{23\pi}{6}\right)$ and $\cos\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(23\pi/6)$



Find $\cos(-9\pi/4)$

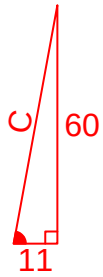
$\sin(23\pi/6) = \frac{-1}{2}$

$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{-60}{11}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

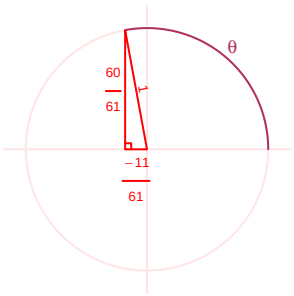
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-11}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 8.62$ meters, an amplitude of 6.93 meters, and a frequency of 4.25 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -6.93\cos(2\pi 4.25t) + 8.62$$

or

$$y = -6.93\cos(8.5\pi t) + 8.62$$

or

$$y = -6.93\cos(26.7t) + 8.62$$